Specifications for Injection Devices to Deliver Imicide Hp into Program Trees in 2004 for the Asian Longhorn Beetle Program

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The USDA APHIS Asian Longhorn Beetle Program intends on using pressurized delivery systems to inject specified volumes of Imicide Hp (10% imidacloprid, manufactured and distributed by the J.J. Mauget Company, Arcadia, CA) into at-risk trees during the 2004 program year. The program year extends from March through October.

Candidate injection systems will be reviewed and qualified for field tests by the USDA APHIS Pest Survey and Detection and Exclusion Laboratory. In order to be considered for the field test, all candidate injection systems must be provided to the lead investigator, Phillip Lewis, PhD, no later than the close of business (4:00 PM ET) on January 21, 2004.

In January 2004, the Laboratory will test qualifying pressurized delivery systems on a stand of eucalyptus trees in Southern California. During the California trials each qualifying candidate injector will be capable of injecting 80, 10" diameter trees over a 7-hour work day without breaking down or requiring recalibration and shall deliver the desired dose of pesticide over the course of each test day.

THE PROSPECTIVE VENDOR MUST HAVE AN EXECUTED TRIAL AGREEMENT SIGNED BY THE CONTRACTING OFFICER BEFORE EVALUATION OF THEIR INJECTION SYSTEM. TO REQUEST A COPY OF THE TRIAL AGREEMENT, SUBMIT A WRITTEN, EMAIL, OR FAXED REQUEST STATING NAME, ADDRESS, TELEPHONE NUMBER, AND EMAIL TO THE CONTRACT SPECIALIST, MARGIE THORSON, at margie.p.thorson@aphis.usda.gov, fax at Area code (612) 336-3209, or address: USDA, APHIS, MRPBS, ASD, Contracting Team, Butler Square West, 100 North Sixth Street, Minneapolis, MN 55403

Two complete systems shall be fully configured for testing, including instruction or training manuals, and shall be at the address below no later than 4:00 pm ET on January 21, 2004:

Program Leader, Insecticide and Applied Technologies Section
USDA-APHIS-PPQ
Pest Survey, Detection and Exclusion Laboratory
Building 1398, W. Truck Rd.
Otis ANGB, MA 02542

Government Estimated Timelines:

1. Testing and evaluation will begin on or about January 27, 2004.
2. Qualified injector systems will be identified on or about February 9, 2004

The systems will be evaluated on several general criteria:

- Ease of use;
- Ability to reliably and consistently deliver a known volume of pesticide to the test trees' active xylem;
- Sound construction;
- Durability under heavy and harsh field use;
- Compatibility with the "USDA tip" or comparable injection tip;
- Does not use plugs or other devices that remain permanently in the tree;
- Minimal damage to integrity of the tree;
- Protection of worker safety, prevention of pesticide exposure;
- Protection of the environment, i.e. leakage prevention

These criteria and the specifications (below) used to grade each system are based on research conducted by the USDA-APHIS-PPQ Pest Survey, Detection and Exclusion Laboratory, field experience in the New York and Illinois ALB programs, and the expressed concerns of USDA APHIS's cooperators.

The Asian Longhorn Beetle programs in New York and Chicago annually inject tens of thousands of trees with systemic insecticides using the J.J. Mauget capsule injection system that requires personnel to guard an injected tree for 4 hours post application. However, the USDA desires an injection system that will allow an applicator to treat a tree and move on.

Several pressure injection methods and formulations have been tested by USDA APHIS in an effort to identify methods that provide efficacious pesticide delivery while protecting the health of the tree, worker and public health and the surrounding environment. The tests have revealed the following:

The USDA injection tip (Figure 1), originally designed for work on Dutch Elm disease, is a suitable vehicle for the trunk / injection interface. The tip is inserted into a ½" hole drilled into the living tissue of a tree trunk by a 7/32" drill bit. The tapered end seals into the injection hole and can withstand several hundred pounds of pressure without leaking. This method has been shown to be no more damaging than the use of Mauget capsules, and results in comparable residue levels.

Plug-based systems are not desirable because of our studies showing that this results in bark splitting at the time of injection and/or vertical splitting in injected trees several

months after injection. Also, there is evidence that the use of plugs to seal the injection site cause the wound to heal slower, and induce more external cracking on ALB host tree species. On a similar note, we have observed that injection devices that use high pressure (300+ psi) cause significant damage to trees. We have selected 200 psi as an acceptable amount of pressure which the tree can withstand.

Currently, Imicide HP is the pesticide employed by the ALB program for trunk injections because it has been proven to be efficacious over many years of testing and comparisons with other imidacloprid formulations. The Hp formulation contains a 10% solution of trunk-injectable imidacloprid, the highest percent that is commercially available. Formulations with a lower percentage of the active ingredient would require twice the amount of formulation to be injected into the trees. The more chemical, the harder it is to deliver into the injection site, and the higher the injection pressure, which is not desirable.

In addition to the above research, other investigations and experience and constraints on treating trees in the ALB program have shown:

- Homeowners and city foresters involved with the ALB program are concerned about the short and long term effects of a tree injection program on the health of their trees.
- Our cooperators in NYC and Chicago do not support the use of trunk injection systems using plugs or other devices that remain permanently in the tree or the use high pressure for the delivery of the chemical application.
- The program needs a unit that is capable of withstanding normal field conditions and use by contractors who will be using the device in rough and/or steep terrain such as in wooded areas, rights of way and railroad lines.

In order to demonstrate that the candidate injector systems can meet these general criteria, they will be evaluated on the following required specifications:

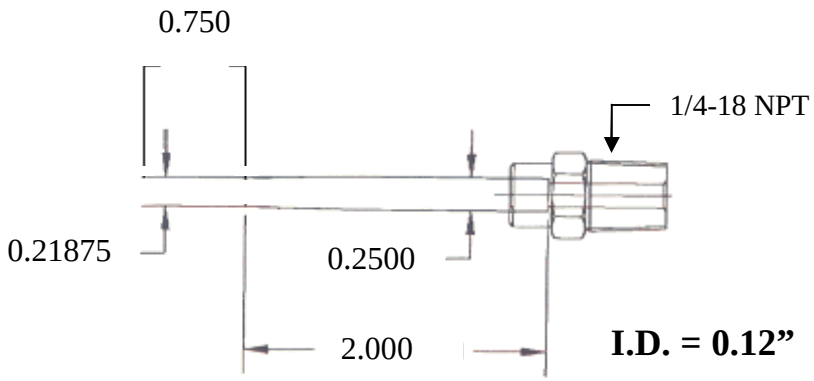
- Bark splitting, bulging and other immediate evidence of tree damage will be used as objective criteria for potential tree damage. Systems shall produce no to minimal tree damage during or immediately following the injection.
- Pesticide shall be delivered directly into the trees' active xylem with out the use of plugs or other devices that remain in or on the tree.
- The system shall be fitted with the USDA ALB injector tip (Figure 1) or comparable tip and the tip shall mount securely in the tree. The tip shall be fitted with a check valve such that fluid will not flow back into the injection device from the tip.
- The system shall deliver pesticide at no more than 200 psi per injection.

- The system shall be fitted with pressure gauge (measurement range: 0-600 psi) with operator controlled pressure regulation and automatic pressure bypass to ensure injection pressure does not exceed 200 psi.
- The system shall deliver pesticide at no more than a 5% deviation from the total dose selected from any given tree.
- The system components, to include all seals, values and internal parts, shall not degrade, corrode or otherwise breakdown during exposure throughout a field season of use to Imicide Hp.
- Under routine and reasonably expected environment, use, transport or handling scenarios (to include but not limited to temperature changes or extremes, proper use, dropping system on ground or other surface, turning the system on its side or upside down) the system shall not leak pesticide.

In addition, the candidate injector systems will be evaluated on the following desirable characteristics: All of the characteristics listed below are <u>desired</u> features that our experience has shown to be of benefit ergonomically and otherwise to the operator.

- The system can be carried by the applicator hands free.
- The system is fitted with a feeder tube to the injection tip of sufficient length to allow the operator to stand during injection.
- The system has a minimum pesticide reservoir of 1 Liter. Higher volumes are permissible and desirable but should not impede the movement of the operator when moving over rough ground, on steeply sloped ground or present a significant ergonomic risk to the operator.
- All gauges and operating valves are clearly readable and visible to the operator during the injection process.
- The system includes detailed but easy to follow operating or training manuals written at no higher than the 6^{th} grade reading level.
- The pressurized injection process should be power-assisted to reduce the need for repetitive injection actions by the applicator. Manual injection systems will be considered but are not desirable.
- Pressurized injection should not produce any backsplash or leakage from the injection site.
- The system is fitted with a quick-disconnect fitting that does not leak pesticide.

Figure 1. ALB Injection Tip



Materials
1/4" stainless steel tubing
SS-4-Tube Socket Weld 1-4